

Radio "Twin-50"

Supplement to The Wireless & Electrical Trader, August 19, 1950

"TRADER" SERVICE SHEET
963

ULTRA "TWIN-50"

Covering also Model R586 "Twin"

DESIGNED to operate from A.C. or D.C. mains of 200-250 V or from self-contained dry batteries, the Ultra "Twin-50" is 4-valve (plus metal rectifier) 2-band portable superhet. Waveband ranges are 190-550 m and 1,200-2,000 m. The differences in the earlier "Twin," model R586, are explained overleaf.

Release dates: *Twin-50*, May, 1950; *Twin R586*, April, 1949. Original price, both models, £13 0s 9d complete, plus purchase tax.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L3** (M.W.), or **L1**, **L3** and loading coil **L2**, with **C24** (L.W.), precedes heptode frequency changing valve (**V1**, **Mazda 1C1**). Trimmers **C2**, **C23** are brought into circuit by **S5** on L.W. Provision is made for the connection of an external aerial via **C1**.

V1 oscillator grid coil **L4** is tuned by **C25** on M.W., with parallel trimming by **C26** and series tracking by **C7**, **C27**. For L.W., the same circuit is used, shunted by the capacitance of **C8**, **C28**. Reaction coupling by **L5** via **S7** (M.W.) or **S8** (L.W.).

Second valve (**V2**, **Mazda 1F3**) is an R.F. pentode operating with fixed bias as intermediate frequency amplifier with tuned transformer couplings **C4**, **L6**, **L7**, **C5** and **C10**, **L8**, **L9**, **C11**.

Intermediate frequency 470 kc/s. Diode signal detector is part of single diode pentode valve (**V3**, **Mazda 1FD9**). Audio frequency component in rectified output is developed across manual volume control **R9** and passed on to control grid of pentode section, which operates as A.F. amplifier.

Resistance-capacitance coupling by **R11**, **C17** and **R13** between **V3** pentode and pentode output valve (**V4**, **Mazda 1P11**).

For battery operation, power supplies are carried by switches **S11(B)**, **S14(B)** and **S16(B)**, which close in that position, as indicated by the suffix (**B**). For mains operation, **S12(M)**, **S13(M)** and **S15(M)** close. **S9** and **S10** are the normal "on/off" switches.

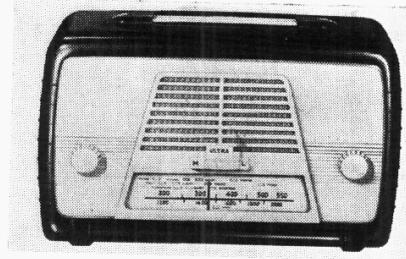
H.T. current is supplied by half wave metal rectifier (**MR1**, **SenTerCel RM2**) consisting of

(Continued Col. 1 overleaf)

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver. They were the same on mains of 230 V, with adjustment appropriately set, as with a set of new batteries. Voltages were measured on the 400 V scale of a Model 7 Avometer whose negative lead was connected to chassis. The rectifier output was 223 V D.C.

Valve	Anode		Screen	
	V	mA	V	mA
V1 1C1 ...	63	0.6	53	1.8
V2 1F3 ...	86	2.1	62	1.0
V3 1FD9 ...	7	0.4	3	0.01
V4 1P11 ...	85.5	4.0	86	0.9



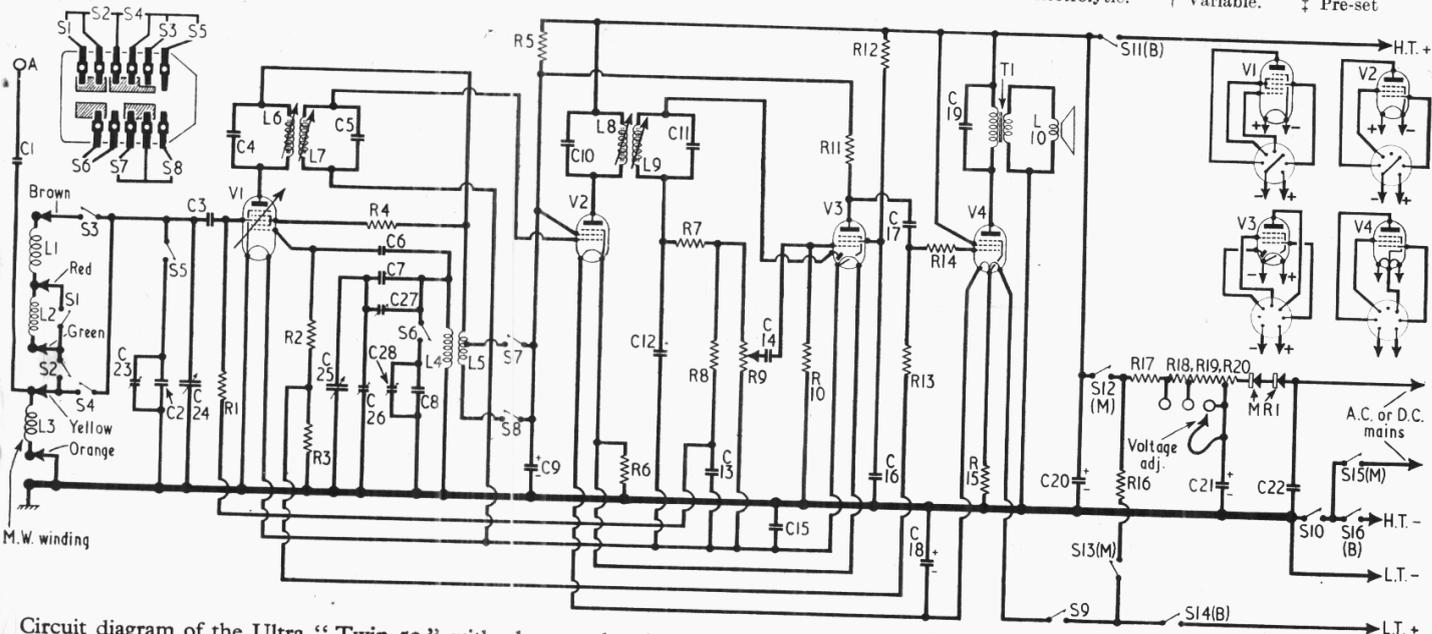
The appearance of the Ultra Twin-50.

COMPONENTS AND VALUES

RESISTORS		Values	Locations
R1	V1 hept. C.G.	1MΩ	G4
R2	V1 osc. C.G.	100kΩ	G4
R3		5.6kΩ	F4
R4	Osc. stabiliser	2.2kΩ	G4
R5	H.T. feed	6.8kΩ	F4
R6	Fil. by-pass	1kΩ	F4
R7	I.F. stopper	100kΩ	F4
R8	A.G.C. decoup.	470kΩ	F4
R9	Vol. control	1MΩ	D3
R10	V3 C.G.	2.2MΩ	F4
R11	V3 anode load	820kΩ	E4
R12	V3 S.G. feed	4.7MΩ	E4
R13	V4 C.G.	2.2MΩ	F4
R14	V4 grid stopper	470kΩ	F4
R15	Fil. by-pass	1kΩ	E4
R16	Fil. ballast	1,690Ω	C2
R17	H.T. smoothing	410Ω	C2
R18	Voltage adjust- ment resistor	340Ω	C2
R19		175Ω	C2
R20			

CAPACITORS		Values	Locations
C1	Aerial series	22pF	—
C2	L.W. trimmer	120pF	F3
C3	V1 hept. C.G.	390pF	G4
C4	1st I.F. trans.	100pF	A2
C5		tuning	100pF
C6	V1 osc. C.G.	47pF	G4
C7	Osc. tracker	540pF	G3
C8	L.W. trimmer	500pF	F3
C9*	H.T. decoup.	2μF	E3
C10	2nd I.F. trans.	100pF	B2
C11		tuning	100pF
C12	I.F. by-pass	100pF	F4
C13	A.G.C. decoup.	0.05μF	F3
C14	A.F. coupling	0.01μF	F4
C15	Fil. by-pass	0.05μF	G4
C16	V3 S.G. decoup.	0.01μF	F4
C17	A.F. coupling	0.01μF	E4
C18*	Fil. by-pass	100pF	B1
C19	Tone corrector	0.005μF	E4
C20*	H.T. smoothing	50μF	C1
C21*		50μF	C1
C22	R.F. by-pass	0.01μF	E3
C23†	L.W. trimmer	120pF	G3
C24†	Aerial tuning	520pF	A2
C25†	Osc. tuning...	520pF	A1
C26†	M.W. trimmer	60pF	G3
C27†	Osc. tracker	120pF	G3
C28†	L.W. trimmer	60pF	G3

* Electrolytic. † Variable. ‡ Pre-set



Circuit diagram of the Ultra "Twin 50," with the waveband switch unit inset at the top left-hand corner, where it is drawn in the M.W. position. The mains/battery switches **S10-S16** are coded (**M**) and (**B**) to indicate when they close.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	L.W. frame	1.8	—
L2	L.W. coil	13.0	—
L3	M.W. frame	1.5	—
L4	Osc. tune coil	2.0	G3
L5	Osc. reaction	6.0	G3
L6	1st I.F. trans.	Pri. 9.0	A2
L7		Sec. 9.0	A2
L8	2nd I.F. trans.	Pri. 9.0	B2
L9		Sec. 9.0	B2
L10	Speech coil	2.6	B1
T1	O.P. trans.	600.0	E4
S1-S8	W/band sw.	—	F3
S9, S10	Power sw.	—	D3
S11-S16	Mains/batt. sw.	—	D3

Circuit Description—Continued.

two units in series for 250 V mains coverage. Smoothing is effected by R16 and electrolytic capacitors C20, C21. Filament current also is taken from the H.T. circuit, the filaments being connected in series and fed via R16.

The filaments remain series-connected for battery operation. V3 filament is not connected to chassis, but several parts of the circuit are returned to the earthy side of it. Bias is obtained from the filament voltage drop, but additional G.B. for V4 is taken from the oscillator voltage at R2, R3.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (pull off); unplug the two battery connectors; unsolder the five coloured frame aerial leads from the tags on the back cover; remove the two self-tapping screws from the ends of the rear chassis flange and withdraw chassis;

to gain access to the underside of the chassis, withdraw the sheet of insulating card which is held by the two cross-members.

When replacing, the frame aerial leads should be connected to the tags on the back cover in accordance with the coloured dot beside each tag.

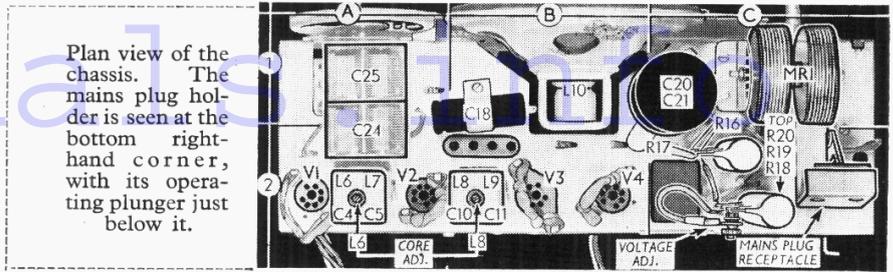
Removing Speaker.—First dismantle the scale assembly (one self-tapping screw with spacer on left, and one with earthing tag, spacer and drive cord pulley on right); release the cursor from the drive cord (un-clamp);

unsolder the leads from the speech coil tags and remove two 4BA cheese-head bolts (with spacers) securing the lower edge of the speaker to the chassis.

GENERAL NOTES

Switches.—S1-S8 are the waveband switches, ganged in a slide-type switch unit indicated in our under-chassis view and shown diagrammatically in the top left-hand corner of our circuit diagram, where it is viewed from the rear of an inverted chassis. S1, S4 and S7 close for M.W. operation; S2, S3, S5, S6 and S8 close for L.W.

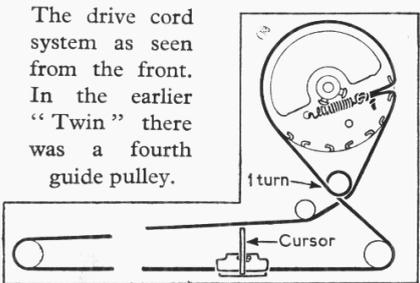
S9, S10 are the Q.M.B. "on/off" switches, ganged with the volume control R9.



Plan view of the chassis. The mains plug holder is seen at the bottom right-hand corner, with its operating plunger just below it.

S11(B)-S15(M), S16(B) are the mains/battery change-over switches, ganged in spring-loaded slide-type switch unit, mounted on the underside of the chassis deck. This is indicated in our under-chassis view, where the tags are identified. In the normal position (plunger out) the receiver is switched to mains operation, and all the switches with the suffix (M) close. When the plunger is pressed in, the (B) switches close for battery operation.

To hold the unit in this position, the mains plug is inserted in the "Mains Plug Receptacle" which we indicate on the chassis deck,



The drive cord system as seen from the front. In the earlier "Twin" there was a fourth guide pulley.

when the pins lock the switch in position. By this ingenious device the mains cannot be connected to the receiver. The receptacle will accept a standard 5 A 2-pin plug; or a standard 5 A 3-pin plug if it does not project too far backwards, which most of them do.

Frame Aerials.—The M.W. (outer) frame winding L3 and the L.W. (inner) frame winding L1 are mounted on a card inside the back cover of the case, together with C1 and the A socket. The L.W. loading coil L2 is wave-wound and situated between them.

Connections to chassis are made by five coloured leads to tags bearing similarly coloured paint-spots. The colours are indicated in our circuit diagram. Reading from top to bottom, the frame tags are: 1, red; 2, green; 3, brown; 4, orange; 5, yellow.

Batteries.—The L.T. battery recommended is Drymax H1186 or Ever Ready AD39, rated at 7.5 V. It has a standard 2-pin connector. The H.T. battery recommended is Drymax 529 or Ever Ready B129, rated at 85.5 V. This has a 3-pin connector, of which the two opposite pins are the active ones. Small swivelled clips prevent the batteries from slipping out.

"Twin" Divergencies.—The "Twin" (model

R586) preceded the Twin-50, and although it was very much like the latter, there were the following differences. R11 went to H.T. positive at the upper end of R5, while V4 was usually a 1P10 and its screen went to the lower end of R5. L7 was returned to the A.G.C. line. R3 was 22 kΩ, R5 was 4.7 kΩ, R11 was 330 kΩ, R12 was 2.2 MΩ and R15 was 1.8 kΩ. The 1P10 and 1P11 valves are not directly interchangeable. If a combined H.T./L.T. battery is used, it is Drydex 527 or Ever Ready 127. The voltage adjustment pig-tail was anchored to R17 instead of to R19, R20. The intermediate frequency was 465 kc/s.

The latest rectifier was an S.T.C. type DRM2B, and R16-R20 were respectively 1,680 Ω, 1,400 Ω, 400 Ω, 410 Ω, 225 Ω. With an earlier version, the rectifier was a 4A79, and R16-R20 then became 1,680 Ω, 1,760 Ω, 350 Ω, 68 Ω, 280 Ω, and the highest mains adjustment tapping was transferred to the opposite end of R20.

Drive Cord Replacement.—Thirty-six inches of nylon braided glass yarn is required for the drive cord, which should be run as shown in the sketch (col. 2) where the chassis is viewed from the front with the gang at maximum. In the "Twin" there was an additional pulley beneath the scale.

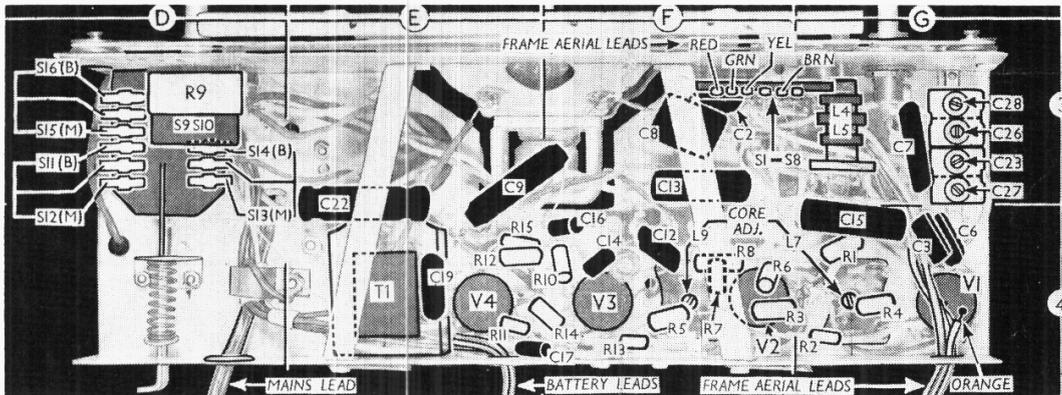
CIRCUIT ALIGNMENT

I.F. Stages.—Remove chassis from case, connect signal generator via a 0.1 μF capacitor to stator vanes of C24, switch set to M.W., turn the gang and volume controls to maximum, feed in a weak 470 kc/s (638.3 m) signal and adjust the cores of L9, L8, L7 and L6 for maximum output. Check that response curve is symmetrical. (In model R586 the I.F. is 465 kc/s.)

R.F. and Oscillator Stages.—Replace chassis in case, or fix frame aerials in their correct positions relative to chassis. In the case, access is gained to trimmers only by half opening the back and partly removing a battery. Couple signal generator via a 131-turn coil of 18 s.w.g. wire on a 3/4-in former 1 1/4-in long. With the gang at maximum, the cursor should coincide with the end calibration dot on the scale.

M.W.—Still switched to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust C26 for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust C27 for maximum output. Repeat these adjustments, while rocking the gang for optimum results, until no improvement results.

L.W.—Switch set to L.W., tune to 1,500 m on scale, feed in a 1,500 m (200 kc/s) signal and adjust C28, then C23, for maximum output. If the M.W. trimmers are subsequently disturbed, the L.W. alignment must be repeated.



Under-chassis view. The mains/battery switches are all identified here in the unit at top left. The waveband switch unit is indicated here, and the frame lead colours are shown. A drawing of the unit is inset in the diagram overleaf.